

General

Title

Thoracic surgery: percentage of patients aged 18 years and older undergoing elective lobectomy for lung cancer who had a prolonged length of stay greater than 14 days.

Source(s)

Society of Thoracic Surgeons (STS). General thoracic surgery database: NQMC measure submission. Chicago (IL): Society of Thoracic Surgeons (STS); 2016 Dec. 31 p.

Measure Domain

Primary Measure Domain

Clinical Quality Measures: Outcome

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure is used to assess the percentage of patients aged 18 years and older undergoing elective lobectomy for lung cancer who had a prolonged length of stay greater than 14 days.

Rationale

It is important for surgeons to be able to compare their surgical outcomes to those of peer institutions as a means of assessing results and improving quality of care. Prolonged length of stay after pulmonary lobectomy is both a surrogate marker of morbidity, but also, importantly, a direct marker of increased resource utilization. Knowing their rate of risk-adjusted prolonged length of stay gives lower performing thoracic programs the opportunity to design quality improvement initiatives. These should lead to better patient outcomes and decreased resource utilization.

Evidence for Rationale

Society of Thoracic Surgeons (STS). General thoracic surgery database: NQMC measure submission. Chicago (IL): Society of Thoracic Surgeons (STS); 2016 Dec. 31 p.

Primary Health Components

Thoracic surgery; lung cancer; elective lobectomy; prolonged length of stay

Denominator Description

Number of patients aged 18 years and older undergoing elective lobectomy for lung cancer (see the related "Denominator Inclusions/Exclusions" field)

Numerator Description

Number of patients aged 18 years and older undergoing elective lobectomy for lung cancer who had a prolonged length of stay greater than 14 days (see the related "Numerator Inclusions/Exclusions" field)

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

A formal consensus procedure, involving experts in relevant clinical, methodological, public health and organizational sciences

One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Additional Information Supporting Need for the Measure

Lobectomy is considered the gold standard for patients with stage I lung cancer and is the most common operation performed for early stage lung cancer within the Society of Thoracic Surgeons (STS) database (Ginsburg & Rubinstein, 1995; Boffa et al., 2008). Approximately 50,000 lobectomies are performed in the United States each year. Prolonged length of stay after lobectomy has been demonstrated to be a surrogate marker for complications after lobectomy (Wright et al., 2008). Patients within the STS General Thoracic Surgery Database (GTSD) with a prolonged length of stay greater than 14 days have a markedly increased mortality rate, 10.8% vs. 0.7% (p less than 0.0001). Patients with lengths of stay longer than 16 days have increased 30-day readmission rates as well (Freeman et al., 2013). Both of these intuitively demonstrate the increase in resource utilization from prolonged length of stay. Variability exists in length of stay following even uncomplicated lobectomy and can be driven by factors such as age, gender, payer, comorbidities, and surgical approach (Giambrone et al., 2016). Reducing postoperative complications and length of stay requires good patient selection and may be enhanced by cardiopulmonary exercise testing in selected patients with marginal pulmonary function (Brunelli et al., 2012). Surgeon factors, such as surgical approach chosen for lobectomy, are a strong predictor of postoperative complications and length of stay. A propensity matched analysis within the STS GTSD demonstrated that thoracoscopic lobectomy reduced both complications as well as length of stay when compared with open lobectomy (Paul et al., 2010). Similarly, an analysis of the National Inpatient Sample demonstrated fewer in-hospital complications and shorter length of stay with a thoracoscopic approach and also demonstrated that only 15% of lobectomies were being done thoracoscopically (Paul et al., 2013). In-hospital, post-surgical

pathways can also alter prolonged length of stay. Implementation of a multimodal enhanced recovery pathway has been associated with a decrease in length of stay and complications with no increase in readmissions (Madani et al., 2015).

Evidence for Additional Information Supporting Need for the Measure

Boffa DJ, Allen MS, Grab JD, Gaissert HA, Harpole DH, Wright CD. Data from The Society of Thoracic Surgeons General Thoracic Surgery database: the surgical management of primary lung tumors. *J Thorac Cardiovasc Surg.* 2008 Feb;135(2):247-54. [PubMed](#)

Brunelli A, Belardinelli R, Pompili C, Xiumi F, Refai M, Salati M, Sabbatini A. Minute ventilation-to-carbon dioxide output (VE/VCO₂) slope is the strongest predictor of respiratory complications and death after pulmonary resection. *Ann Thorac Surg.* 2012 Jun;93(6):1802-6. [PubMed](#)

Freeman RK, Dilts JR, Ascioti AJ, Dake M, Mahidhara RS. A comparison of length of stay, readmission rate, and facility reimbursement after lobectomy of the lung. *Ann Thorac Surg.* 2013 Nov;96(5):1740-5; discussion 1745-6. [PubMed](#)

Giambrone GP, Smith MC, Wu X, Gaber-Baylis LK, Bhat AU, Zabih R, Altorki NK, Fleischut PM, Stiles BM. Variability in length of stay after uncomplicated pulmonary lobectomy: is length of stay a quality metric or a patient metric?. *Eur J Cardiothorac Surg.* 2016 Apr;49(4):e65-71. [PubMed](#)

Ginsburg RJ, Rubinstein LV. Randomized trial of lobectomy versus limited resection for T1 N0 non-small cell lung cancer. *Ann Thorac Surg.* 1995 Sep;60(3):615-22; discussion 622-3. [PubMed](#)

Madani A, Fiore JF Jr, Wang Y, Bejjani J, Sivakumaran L, Mata J, Watson D, Carli F, Mulder DS, Sirois C, Ferri LE, Feldman LS. An enhanced recovery pathway reduces duration of stay and complications after open pulmonary lobectomy. *Surgery.* 2015 Oct;158(4):899-908; discussion 908-10. [PubMed](#)

Paul S, Altorki NK, Sheng S, Lee PC, Harpole DH, Onaitis MW, Stiles BM, Port JL, D'Amico TA. Thoracoscopic lobectomy is associated with lower morbidity than open lobectomy: a propensity-matched analysis from the STS database. *J Thorac Cardiovasc Surg.* 2010 Feb;139(2):366-78. [PubMed](#)

Paul S, Sedrakyan A, Chiu YL, Nasar A, Port JL, Lee PC, Stiles BM, Altorki NK. Outcomes after lobectomy using thoracoscopy vs thoracotomy: a comparative effectiveness analysis utilizing the National Inpatient Sample database. *Eur J Cardiothorac Surg.* 2013 Apr;43(4):813-7. [PubMed](#)

Society of Thoracic Surgeons (STS). General thoracic surgery database: NQMC measure submission. Chicago (IL): Society of Thoracic Surgeons (STS); 2016 Dec. 31 p.

Wright CD, Gaissert HA, Grab JD, O'Brien SM, Peterson ED, Allen MS. Predictors of prolonged length of stay after lobectomy for lung cancer: a Society of Thoracic Surgeons General Thoracic Surgery Database risk-adjustment model. *Ann Thorac Surg.* 2008 Jun;85(6):1857-65. [11 references] [PubMed](#)

Extent of Measure Testing

General Thoracic Surgery Database (GTSD) participating sites are randomly selected for participation in the Society of Thoracic Surgeons (STS) GTSD Audit, which is designed to evaluate the accuracy, consistency, and comprehensiveness of data collection and ultimately validate the integrity of the data contained in the database. Telligen, formerly the Iowa Foundation for Medical Care, has conducted audits on behalf of STS since 2006. In 2015, ten percent of randomly selected STS GTSD participants (N = 25, an increase from 24 in 2014 and 18 in 2013) were audited. The audit process involves re-abstracting of

data for 20 cases records (at least 15 lobectomy and up to 5 esophagectomy) and comparison of 40 STS GTSD V2.2 individual data elements with those submitted to the data warehouse. Agreement rates are calculated for each variable, each variable category and overall. In 2015, the overall aggregate agreement rate was 97.02%, demonstrating that the data contained in the STS GTSD are both comprehensive and highly accurate.

Data Analysis

Aggregate agreement rates were computed for all facilities by calculation of the sum of all facilities' numerators divided by the sum of all facilities' denominators, for each individual variable, each variable category and overall.

Chi-square statistics were calculated to identify any possible relationships between the data collection process variables and agreement rates. Tests where the chi-square statistic had a probability of less than 5% (p less than 0.05) were considered to show statistically significant differences in agreement rate between the levels of the process measure.

Agreement Rate Results

Database validity was evaluated by re-abstraction of defined variables from the medical records and comparison to submitted data. Agreement rates were calculated at the individual variable level, category level and overall. Aggregate agreement rates are presented in the table in the original measure documentation. There were 14,854 total variables abstracted and of those 14,412 variables matched, resulting in an overall agreement rate of 97.02%.

Process Variable Correlation Tables

The relationships between process variables and overall agreement rates were examined and included:

- Facility data collection performed from electronic medical records or a combination of paper and electronic medical records and overall agreement rate
- Facility data collection method (concurrent/retrospective/both) and overall agreement rate
- Data collection performed by a single abstractor or multiple staff and overall agreement rate
- Attendance at the annual data managers' meeting, STS Advances in Quality and Outcomes (AQO) Conference, and overall agreement rate
- Agreed upon abstraction location for data elements documented in multiple locations and overall agreement rate

Relationship between Data Collection Source & Agreement Rate

Facilities using an electronic health record (EHR) for data collection had higher agreement rates, 97.36%, than those facilities using both paper medical records and an EHR, 96.31%. There were no facilities that used paper medical records alone (p less than 0.0004).

Relationship between Data Collection Method & Agreement Rate

Facilities collecting data retrospectively have higher agreement rates, 97.55%, than those facilities collecting data concurrently, 96.18%, or both, 96.38% (p equal to or less than 0.0001).

Relationship between Data Collection Performed by a Single Abstractor or Multiple Staff & Agreement Rate

Facilities with a single individual performing data abstraction have higher agreement rates, 98.02%, than those facilities that have multiple individuals performing data abstraction, 96.24% (p less than 0.0001).

Relationship between Attendance at AQO Conference & Agreement Rate

Facilities having staff attend the annual AQO Conference have higher agreement rates, 97.25%, than those that do not have staff attend, 96.11% (p less than 0.0012).

Relationship between Have an Agreed Upon Location & Agreement Rate

Facilities that utilize an agreed upon location for data elements recorded in multiple locations have higher agreement rates, 97.31%, than facilities that do not utilize an agreed upon location, 93.61% (p less than 0.0001).

In addition, validity is regularly assessed by an expert panel of general thoracic surgeons assembled by the STS General Thoracic Surgery Database Task Force, the STS Quality Measurement Task Force, and the STS Task Force on Quality Initiatives, all of which report to the STS Workforce on National Databases.

Evidence for Extent of Measure Testing

Society of Thoracic Surgeons (STS). General thoracic surgery database: NQMC measure submission. Chicago (IL): Society of Thoracic Surgeons (STS); 2016 Dec. 31 p.

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Hospital Inpatient

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Clinical Practice or Public Health Sites

Statement of Acceptable Minimum Sample Size

Unspecified

Target Population Age

Age greater than or equal to 18 years

Target Population Gender

Either male or female

National Strategy for Quality Improvement in Health Care

National Quality Strategy Aim

Better Care

National Quality Strategy Priority

Prevention and Treatment of Leading Causes of Mortality

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Living with Illness

IOM Domain

Effectiveness

Data Collection for the Measure

Case Finding Period

36 months

Denominator Sampling Frame

Patients associated with provider

Denominator (Index) Event or Characteristic

Clinical Condition

Institutionalization

Patient/Individual (Consumer) Characteristic

Therapeutic Intervention

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions

Number of patients aged 18 years and older undergoing elective lobectomy for lung cancer

Denominator Details

Lung cancer (LungCancer – Society of Thoracic Surgeons [STS] General Thoracic Surgery Database [GTSD] sequence number 830) is marked "yes" and category of disease – primary (CategoryPrim – STS GTSD sequence number 1300) is marked as one of the following (International Classification of Diseases, Ninth Revision [ICD-9], International Classification of Diseases, Tenth Revision [ICD-10]):

- Lung cancer, upper lobe (162.3, C34.10)

- Lung cancer, middle lobe (162.4, C34.2)

- Lung cancer, lower lobe (162.5, C34.30)

- Lung cancer, location unspecified (162.9, C34.90)

Primary procedure is a one of the specific Current Procedural Terminology (CPT) codes for lobectomy (refer to the original measure documentation for specific CPT codes)

Status of operation (Status – STS GTSD sequence number 1420) is marked as "elective"

Gender (Gender – STS GTSD sequence number 190) is marked "male" or "female," surgery date (SurgDt – sequence number 1340), and discharge date (DischDt – sequence number 2190) are provided

Only analyze first operation of hospitalization meeting criteria 1 to 4

Exclusions

None

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions

Number of patients aged 18 years and older undergoing elective lobectomy for lung cancer who had a prolonged length of stay greater than 14 days

Numerator Details: Prolonged postoperative length of stay (PLOS) is defined as a yes/no variable indicating postoperative hospital stay of greater than 14 days, using surgery date (SurgDt – Society of Thoracic Surgeons [STS] General Thoracic Surgery Database [GTSD] sequence number 1340) and discharge date (DischDt – STS GTSD sequence number 2190) to calculate PLOS.

Exclusions

Unspecified

Numerator Search Strategy

Institutionalization

Data Source

Administrative clinical data

Electronic health/medical record

Paper medical record

Registry data

Type of Health State

Adverse Health State

Instruments Used and/or Associated with the Measure

The Society of Thoracic Surgeons General Thoracic Surgery Database (GTSD) Major Procedure Data Collection Form Version 2.3

Computation of the Measure

Measure Specifies Disaggregation

Does not apply to this measure

Scoring

Rate/Proportion

Interpretation of Score

Desired value is a lower score

Allowance for Patient or Population Factors

not defined yet

Description of Allowance for Patient or Population Factors

The Society of Thoracic Surgeons (STS) General Thoracic Surgery Database was queried for patients with lobectomy for lung cancer. A model of preoperative risk factors was developed by multivariate stepwise logistic regression setting the threshold for prolonged length of hospital stay (PLOS) at 14 days. Morbidity was measured as postoperative events as defined in the STS database. Risk-adjusted results were reported to participating sites.

The final PLOS model included the covariates of age, gender, Zubrod score (0 to 4), American Society of Anesthesiology (ASA) class (1 to 5), insulin-dependent diabetes (yes/no), renal dysfunction (none/serum creatinine level greater than 2 mg/dL/dialysis), preoperative therapy (chemotherapy or thoracic radiation/none), forced expiratory volume in 1 second (FEV1; % predicted), smoking (ever/never), year of operation (0 for first year in data set, 1, 2, etc., for subsequent years).

For more information, refer to *Predictors of Prolonged Length of Stay after Lobectomy for Lung Cancer: a Society of Thoracic Surgeons General Thoracic Surgery Database Risk-Adjustment Model* (see the

"Companion Documents" field).

Standard of Comparison

not defined yet

Identifying Information

Original Title

Risk-adjusted length of stay >14 days after lobectomy for lung cancer.

Measure Collection Name

General Thoracic Surgery Measures

Submitter

Society of Thoracic Surgeons - Medical Specialty Society

Developer

Society of Thoracic Surgeons - Medical Specialty Society

Funding Source(s)

Unspecified

Composition of the Group that Developed the Measure

The Society of Thoracic Surgeons (STS) General Thoracic Surgery Database Task Force. Please contact STS for list of members.

Financial Disclosures/Other Potential Conflicts of Interest

Unspecified

Adaptation

This measure was not adapted from another source.

Date of Most Current Version in NQMC

2016 Dec

Measure Maintenance

Unspecified

Date of Next Anticipated Revision

Unspecified

Measure Status

This is the current release of the measure.

Measure Availability

Source not available electronically.

For more information, contact the Society of Thoracic Surgeons (STS) at 633 N. Saint Clair Street, Floor 23, Chicago, IL 60611; Phone: 312-202-5800; Fax: 312-202-5801; Web site: <http://www.sts.org>

Companion Documents

The following is available:

Wright CD, Gaissert HA, Grab JD, O'Brien SM, Peterson ED, Allen MS. Predictors of prolonged length of stay after lobectomy for lung cancer: a Society of Thoracic Surgeons General Thoracic Surgery Database risk-adjustment model. Ann Thorac Surg. 2008 Jun;85(6):1857-65. Available from the [Annals of Thoracic Surgery Web site](#) .

NQMC Status

This NQMC summary was completed by ECRI Institute on January 9, 2017. The information was verified by the measure developer on February 7, 2017.

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Production

Source(s)

Society of Thoracic Surgeons (STS). General thoracic surgery database: NQMC measure submission. Chicago (IL): Society of Thoracic Surgeons (STS); 2016 Dec. 31 p.

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